Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	DOCKET FILE COPY ORIGINAL
Allocation of Spectrum Below	)	ET Docket No. 94-32
5 GHz Transferred from	)	
Federal Government Use	)	

COMMENTS OF APPLE COMPUTER, INC.

Apple Computer, Inc. ("Apple") hereby submits its comments in response to the Federal Communications Commission's (the "Commission") Notice of Inquiry ("NOI") in the above-referenced proceeding. In the NOI, the Commission seeks information on potential applications of 50 MHz that is being transferred to private sector use. With respect to this proceeding, of the three bands identified for immediate transfer, Apple will address only the 2402-2417 MHz frequency segment that is currently allocated for, *inter alia*, ISM applications, amateur operations, and unlicensed low power communications devices operating under parts 15.247 and 15.249 of the Rules. These latter rules allow certain spread-spectrum technologies or extremely limited transmitter power, or both.

Apple is concerned that future licensed uses of the 2402-2417 MHz band will undermine the usability of the 2400 MHz ISM band for unlicensed operations. An underlying issue, presented by, but passed over in, the NOI, is the assumption that any such licensed access to the band would be subject to auction procedures to raise revenue for the Federal Government. In this respect, the Commission should examine the relative values of auctioning the 2402-2417 MHz band, or allowing preemptive new services to intrude upon the present and already identified users of unlicensed technologies.

As the Commission noted, the majority of the spread spectrum devices operating today in the ISM bands employ the 902-928 MHz band.[1] This simply represents the relative ease of developing such products compared with 2400 MHz products. The 900 MHz band is becoming loaded by the very variety of applications the Commission

[1] See footnote 14 of the NOI

sought to encourage. The band, however, is increasingly congested. More ominously, there is a pending proposal for deployment of licensed Automatic Vehicle Monitoring (AVM) systems in this band.[2] Not only would such systems cause interference to unlicensed devices, but also such primary users could require that unlicensed devices cease operation they are found to cause interference.

The only practical and available refuges today from such displacement from the 900 MHz band are the other ISM bands, at 5800 MHz and particularly the 2400 MHz band. The Commission notes, accurately, that "it is likely that use of [the 2400 MHz band] by spread spectrum devices will increase.[3] This is an understatement. The reality is that the great majority of new product development in the computer-communications industry, and the creation of standards, is focused explicitly on the 2400 MHz ISM band.

For example, the Institute of Electrical and Electronic Engineers, Inc. ("IEEE") Project 802 Local and Metropolitan Area Network Standards Committee has been engaged since September 1990 in preparing a Local Area Network standard for data communication over a radio medium and has participated in the rounds of comments and reply comments in the PCS proceeding[4]. The IEEE standards activity has encompassed the interests and energies of a very wide constituency of data-communications companies. The IEEE activity has shifted from its early focus on the 900 MHz band, to its emphasis today on the 2400 MHz band.

At this time, the 2400 MHz band is severely impacted by microwave ovens and other uses, as the NTIA demonstrates in its Preliminary Spectrum Reallocation Report (the "Report"). Especially, the Report concludes that communications services, if required to use the central portion of the band (2425-2475 MHz), would have to employ considerable RF power. Moreover, even use of the transferred spectrum (2402-2417 MHz) which is thought to be less burdened by microwave ovens, requires robust modulation schemes and technologies including advanced error correction. Although Apple and other companies are developing such schemes for this band, these schemes do not leave much bandwidth to apply to the new communications technologies

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[2] The "Part 15 Alliance," an ad hoc group of users of that band, have amply and effectively presented arguments to the FCC against such redirection of that band to primary usage by such licensed operations. We will not repeat those arguments, but suggest that similar arguments are applicable to the 2400 MHz band.

[3] Ibid

[4] GEN Docket No. 90-314

themselves. Introduction of additional high-powered licensed services, coupled with §15.247, which effectively requires use of the whole band for, *e.g.*, frequency hopping technologies or direct sequence systems, would present an overwhelming burden on such new technologies.

Apple's initiative for new Data-PCS frequencies in the PCS proceedings, and the widespread support given Data-PCS by industry, was triggered in part by this outlook for the ISM bands. At this juncture, immediately following release of the Commission's PCS Memorandum Opinion and Order,[5] it is by no means assured that frequencies useful for "nomadic" computing devices will become available, in adequate quantity, for some years. To disable the single band available today for development of such devices, the 2400 MHz band, by introducing new licensed services prior to "last link" clearing of incumbents in and adjacent to the new PCS band,[6] would leave essentially no usable spectrum in the near term for the wireless information industry.

International considerations also dictate that the present status of the band must not be undercut. The 2400 MHz band is used worldwide for true Industrial-Scientific-Medical devices including microwave ovens, and region-by-region or country-by-country, the band is being made available for communications along the line of the current U.S. operations under §15.247/249. Frequency compatibility across the globe is a vital goal that must not be precluded by introduction of new, potentially overwhelming, interference sources.

Respectfully submitted,

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[5] FCC 94-144, released June 13, 1994
[6] 1920-1930 MHz

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